

APPENDIX D

Analysis of Title IV Systems

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TITLE IV SYSTEM ANALYSIS
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1. TITLE IV SYSTEM PHYSICAL PROFILES

This section of Appendix D contains the individual Title IV system profiles developed by the Project EASI/ED TP team as a result of the meetings held between February 11 and March 09, 1998. These profiles describe the physical characteristics of each Title IV system with specific emphasis on the:

- Current operating environment, application software, and data management software.
- Physical structure of the application software and the relationships between the application structure components (subsystems, modules, objects, etc.) and the application structure and data.

1.1 Campus Based System (CBS)

CBS is physically divided into two main environments:

- PC systems
- mainframe system

The PC systems were developed in Clipper, the mainframe subsystems are COBOL using VSAM data management software.

The PC systems are broken into two types:

- those that function as standalone systems performing a specific function
- those that act as interface between incoming data and the mainframe system

Two examples of the PC based systems that perform a specific function are:

- PART (Procedure Application Report Tracking) - This PC system validates that the schools are following the Skip Tracing procedures. Schools must submit a report documenting that they are following IRS skip tracing procedures. This PC system receives the report, processes the information, and validates compliance. This PC system is completely independent of CBS.
- PLIST (Perkins Loan Institutional Status Tracking) - This system tracks any funds received from Perkins Loan institutions that are either liquidating or are regarded as having "excess cash". This PC system uses data from the mainframe (CBS Master file) otherwise it is completely independent of CBS.

These PC systems are physically independent of CBS other than requiring data from the CBS master file.

An example of a PC system that receives information, processes the information, and then sends the information on to the mainframe would be the Return Log System. This PC system receives the FISAPS from the schools, processes them and creates a file that can then be transmitted to the EDIT/Update Subsystem that processes the data and edits/updates the CBS Master file on the mainframe. These PC systems are physically independent other than the data that they exchange.

The mainframe system is made up of the 11 subsystems as described in the CBS Central Facility Overview. These subsystems are made up of COBOL programs and sub-programs. Based on the

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information found in the CBS Central Facility Overview and confirmation and clarification of the information in the meeting held with CBS personnel, the following statements can be made:

- There is a sequential dependency between eight of the eleven subsystems. CBS supports a yearly business cycle. Each subsystem supports at least one particular business cycle phase. Certain subsystems are dependent on the other subsystems to process and prepare information for their use.
- The subsystems are independent of one another in the sense that they do not share code.
- The Accounting Transaction Subsystem is the central subsystem within CBS. All of the other subsystems, except the Allocations Subsystem, Report Programs, and DRAP Subsystem process information and create a file(s) that is used by the Accounting Transaction Subsystem.
- The primary relationship/dependency between the subsystems is at the data level. All of the subsystems interact with the CBS Master file except the Table Maintenance Subsystem. The next most actively used table is the Table File. This file serves as the data dictionary, the data element locator, edit error messages, allocation parameters, and Common Accounting Numbers (CAN). The majority of subsystems receive data, process the data, and either directly update the CBS Master file or produce a transaction file that is used by another subsystem.
- The data file relationships/dependencies are clearly defined. Data volume and timing is directly related to the business cycle that CBS must follow. Pre-determined milestones are clearly defined in the business process. These milestones are mandated by legislation.
- CBS has one major external interface with ED CAPS. This interface is an accounting data transaction file.
- CBS is currently undergoing a BPR effort to streamline processes and modernize the systems. The PC systems will be upgraded to Visual C++ 2.0. The mainframe system will go away. The business rules will be reevaluated Oct. 1998. They are reevaluated every five years.
- CBS is scheduled to migrate to Band 1 in June 1998.

1.2 Central Database System (CDS)

The Central Database System (CDS) is the central repository for all loan level data on Direct Loans, including aggregated financial data reported from the Direct Loan servicer. Specifically CDS:

- Receives booked loan data from LOS.
- Receives consolidated loan payoffs, confirmations, and the consolidation loan information from LCS.
- Associates the loan data with any previous loan records received for the same borrower.
- Receives borrower payment data from the lockbox and the EDA contractor.
- Determines the servicing location for each borrower.
- Maintains borrower disbursement and adjustment detail.
- Transfers defaulted and rehabilitated loans to and from the Department's Debt Collection System (DCS).
- Maintains and reports central Direct Loan accounting data to the Department's Primary Accounting System.

CDS is the central coordinator and routing point for Direct Loan information. LOS, LSS, and LCS route all of their data through CDS. LOS, LSS, LCS do not interface directly with one another.

CDS has two primary components:

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1. CDS Non-Accounting
2. CDS Accounting

The CDS accounting component is FARS (Financial Accounting and Reporting System). FARS currently is used as the accounting (and general ledger) subsystem of the Direct Loan Servicing System (DLSS). FARS is written in IBM COBOL II. It uses a VSAM file structure and the CICS teleprocessing system.

CDS runs on an IBM ES/9000 with a MVS/ESA operating system. The non-accounting subsystems are written in IEF COBOL (Batch) and C++ (On-line client/server workstation programs) using a DB2 database. Both the batch and on-line are generated by Composer.

The only dependency between the non-accounting and accounting sides of CDS is at the data level. Files are developed and transmitted from the non-accounting side of CDS to the accounting side (FARS). FARS then reads the files.

CDS physical program structure is based on standard transaction sets. Each process has its own unique set of programs. These programs are used only within one process. However, these programs make calls back to a primary program for processing. For example, programs 16A, 16B, 16C, 16D are unique programs designed to process specific transaction sets. However, they all call program 16 as part of the processing. 16A, 16B, 16C, 16D provide different parameters to 16 which adjusts the transaction processing accordingly.

CDS has three batch types:

1. Financial - financial data
2. Non-Financial - Names, addresses, statuses, etc.
3. General Information - Errors, Acknowledgments, etc.

Batch programs within CDS read data from the database as well as passing files between themselves as they are processed.

CDS is the owner of the Institution Table. This table of information is used by the other systems, LOS, LSS, and LCS. Updates to the table are made through CDS. When updates are made, new versions of the institution table are transmitted to the other systems where the new data is processed and their databases are updated.

CDS currently supports a MIS (reporting system). This system is physically separate from CDS. It uses Rdb in a VAX environment. Each month a snapshot of the data provided by servicers and from FARS is loaded in the MIS.

The following conclusions can be drawn from analysis, documentation and the meeting:

- CDS maps to 5 of the Project EASI/ED subsystems: Aid Application, Aid Repayment, Aid Origination and Disbursement, Accounting, and Program Management and Oversight.
- The only dependency between the non-accounting side of CDS and the FARS component are the files sent from the non-accounting side to the FARS side for processing.
- Subsystems/modules are independent of one another at the code level (i.e. no sharing of code across subsystems/modules).

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- A sequential dependency exists between the subsystems. The order that the subsystems operate in reflects the business process. These sequential dependencies are well documented in the CDS documentation.
- Subsystems have dependencies at both the file and database level. Certain subsystems expect files from other subsystems. Some subsystems interact with the main CDS database but are dependent on other subsystems to add/update the information in the database.
- CDS has a set of primary central code that supports all of the processing within CDS. For each process there is a unique set of programs that support that particular process. Calls are made back to the primary central code (16A, 16B, 16C....., call 16).
- The physical structure of application code of the non-accounting side of CDS is very well structured and defined. Programs supporting each logical process are clearly identified and defined.

1.3 Central Processing System (CPS)

The primary role of the Central Processing System (CPS) is the processing of Title IV student applicant data.

CPS runs on an IBM 9672 with a MVS operating system. The subsystems are written in COBOL II using a DB2 database.

CPS has six major components (systems) as documented in the *Overview - System CPS (96-97)* and confirmed in the meeting:

1. Applicant Data Processing
2. Services for Schools and States
3. Applicant Data Access
4. Auxiliary Services
5. User Software
6. ACCESS+ System

Each of these systems is composed of subsystems. For purposes of this transition plan, the analysis was focused on mappings of Project EASI/ED functionality to the subsystems and the dependencies among subsystems and between subsystems and data. The following list shows the systems and the subsystems they are composed of per the *Overview - System CPS (96-97)* document. Additions were made to this list as a result of the meeting and are discussed after the list.

- 1. Applicant Data Processing Component**
 - Electronic Receipt and Editing Subsystem
 - Compute Subsystem
 - Electronic Preparation and Transmission Subsystem
 - Printing and Mailing Subsystem
- 2. Services for Schools and States**
 - Tapes and Diskettes Subsystem
 - Renewal Application Processing Subsystem
 - EDE Request (year-to-date) Subsystem
 - Federal Data Request Subsystem
 - Return Mail Subsystem
- 3. Applicant Data Access**

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- Inquiry Subsystem
- Image Management Subsystem
- 4. Auxiliary Services**
 - Management Information System
 - Sample Database
 - Auxiliary File Maintenance
 - Electronic Payment Process
- 5. User Software**
 - FAFSA Express Subsystem
 - AWARE Subsystem
 - EDEExpress
- 6. ACCESS+ System**
 - Configuration Management Subsystem
 - Project Status Information Subsystem
 - Management Information Statistics Display Subsystem
 - Requirement Information Subsystem
 - E-Mail Subsystem
 - CPS Main Menu Subsystem
 - Customer Service Call Tracking System

Per discussions in the meeting, two more subsystems were added to the system grouping “User Software”:

1. FAFSA on the WEB
2. Renewal FAFSA on the WEB

One subsystem was added to the system grouping “Applicant Data Processing”:

1. History Correction Subsystem

FAFSA on the WEB is a mechanism by which applicants can fill out and submit applications for student aid. Renewal FAFSA on the WEB is strictly for renewal applications. It has its own separate Database. It requires the user to have a PIN access number. These two subsystems do not share code. They do share data from the institutional database.

The History Correction Subsystem is used to process corrections to FAFSAs after they have been sent out to the applicant for verification and subsequently returned with corrections.

An additional process was noted at the meeting:

- **End of Year Budget Support** - This process creates a statistically valid sample database from the main CPS database. This sample database is used to perform statistical analysis for determining the following years potential eligibility amount based on the total number of applications processed.

The Renewal Application Processing Subsystem creates its own Database at the beginning of each FAFSA business cycle. This database’s purpose is to handle renewal application processing. The database contains ~7 million records. Corrections to renewals are stored in this database, not the main CPS database.

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5 separate databases were identified:

1. CPS main database
2. renewal database (Renewal Application Processing Subsystem)
3. statistical sample database
4. Renewal FAFSA on the WEB database
5. institutional database

Subsystems within CPS do access information from multiple databases, either independently or in combinations.

The following conclusions can be drawn from analysis, documentation and the meeting:

- CPS maps to 1 of the Project EASI/ED subsystems: Aid Application.
- Subsystems are independent of one another at the code level (i.e. no sharing of code across subsystems).
- A sequential dependency exists between the subsystems. The order that the subsystems operate reflects the business process. These sequential dependencies are well documented in the CPS documentation.
- Subsystems have dependencies at both the file and database level. Certain subsystems expect files from other subsystems. Some subsystems interact with the main CPS database but are dependent on other subsystems to add/update the information in the database. These dependencies are well documented in the CPS documentation.
- EDExpress, AWARE, FAFSA on the WEB, and Renewal FAFSA on the WEB, are PC based/WEB based software that run completely independently from the mainframe subsystems.
- CPS requires minor modifications in order to address the Y2K problem. They plan on addressing these problems during the 1999-2000-development cycle. This means a new version of CPS that would be Y2K compliant would be released in Jan. 1999.
- Migration to Band 1 is not exactly known. The last tentative date was Oct.1998.
- EDExpress is being upgraded to 32bit capability.

1.4 Federal Family Education Loan Program (FFELP)

FFELP is composed of four major systems. The following is a list of those systems with a shortened version of the full description. The full description can be found in the FFELP document *FFEL Overview Document, V1.08, 9/24/96*.

Debt Management and Collections System - The Debt Management and Collections System (DMCS) is the largest component of the FFEL Project. It provides a vehicle for the storage, retrieval, and editing of debtor information. Payments on defaulted accounts are processed through the National Payment Center as part of this system. In addition, official correspondence to the debtors from ED, the collection agencies, and other interested parties is provided by this system. Interactive Voice Response System (IVRS), Treasury Offset, and Skiptrace efforts are another part of this component.

Guaranty Agency Service - The Guaranty Agency Service processes Guaranty Agency (GA) requests, provides periodic reporting of their activity, and produces an annual summary of defaulted accounts. This system handles accounts payable and receivable for GAs.

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Lender and School Services - The Lender and School Services is responsible for calculating and processing interest payments, federal claims, and loan assignments. This system handles accounts payable and receivable for lenders and schools.

Support and Maintenance Services - Support Services provides department, maintenance, and documentation of software programs necessary to accomplish the objectives of the other services. Archiving, account maintenance, and configuration management are accomplished within this component. Quality Control is included in this component also.

FFELP runs on an IBM 9672 with a MVS/ESA operating system. The subsystems were written in COBOL II (just converted to COBOL MVS) using an IDMS (Network Database) database. EASYTRIEVE is used in a few areas.

FFELP is currently conducting some preliminary prototype efforts with client/server and relational database. They are using INFORMIX as the database management system and C++ as the development language. The intention is to be able to off load some of the processing load from the mainframe and to provide supplemental support to users through the strengths of a relational database (i.e., ad hoc queries). This effort is in its infancy. No SOW, no work plans exist. The contractor described the effort as one of their 'experiments'.

FFELP has over 40 clearly defined subsystems that are documented in the *FFEL Overview Document, VI.08, 9/24/96* and that were confirmed in the meeting.

Debt Management and Collections System

- Accounting (ACC) Subsystem
- Administrative Wage Garnishment (AWG) Subsystem
- Billing (BIL) Subsystem
- Collection Agency Reporting (CAR) Subsystem
- Collections (COL) Subsystem
- Credit Bureau Reporting (CBR) Subsystem
- Data Manipulation - File Maintenance (FLM) Subsystem
- Data Maintenance - Audit (AUD) Subsystem
- Department of Justice (DOJ) Subsystem
- Federal Defaulter (FDP) Subsystem
- Federal Direct Student Loans (DIR) Subsystem
- Income Contingent Repayment Plan (ICR)
- Interactive Voice Response System (IVRS)
- IRS Skip Trace (SKP) Subsystem
- Federal Treasury Offset (IRS) Subsystem
- Letters (LET) Subsystem
- New Debts (NEW) Subsystem
- Pre-Claims/Skip Tracing/Mailing (PRE) Subsystem
- Rehabilitation (RHB) Subsystem
- Reporting and Control (MGT) Subsystem
- On-Line Help (HLP) Subsystem
- On-Line Workload Scheduling (OWS) Subsystem
- Research (RES) Subsystem

Guaranty Agency Service System

- Guaranty Agency Funds (GAF) Subsystem
- Guaranty Agency Quarterly Reporting (GAQ) Subsystem

Lender and School Services System

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- Federal Claims and Loan Assignments (FISL) Subsystem
- Interest Payment (INT) Subsystem (799)
- Perkins/NDSL Federal Claims (CLM) Subsystem
- School and Lender (SAL) Subsystem

Support and Maintenance System

- Production Scheduling Reports (PSR) Subsystem
- Archive and Restore (ARC) Subsystem
- Configuration Management Automated System (CMS) Subsystem
- Credit Reform (CRM) Subsystem
- Financial Information (FIS) Subsystem
- Funding (FND) Subsystem
- Invoicing (INV) Subsystem
- NSLDS Interfacing (S-NSL) Subsystem
- Management Operations Report (MGT) Subsystem
- Quality Control (QUA) Subsystem
- Utility (UTL) Subsystem
- Subledger (SBL) Subsystem
- Warehouse Inventory Reporting (WIR) Subsystem
- Warehouse Management Information (WHD) Subsystem

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The following conclusions can be drawn from analysis, documentation and the meeting:

- FFELP maps to 5 of the Project EASI/ED subsystems: Aid Application, Accounting, Aid Origination and Disbursement, Aid Repayment and Program Management and Oversight.
- There are no physical code dependencies across the four major systems of FFELP. Subsystems and their supporting COBOL programs exist in only one system area.
- The system “Support and Maintenance System” contains the common action blocks and utility support programs that are accessed by all systems/subsystems.
- The logical processes of FFELP as identified in the DFD exactly match the physical structure of the subsystems in FFELP. The only exception is the process “Manage NPC”. A set of policies and procedures and a series of CICS screens within FFELP support this process.
- A specific program for that type within a system handles each type of input file (from external entities). Each and every program is only responsible for one type of input file.
- Each subsystem handles the creation and sending of outgoing files. One program is responsible for only one type of output file.
- Files are passed between subsystems and subsystems are dependent on data being provided in the database from other subsystems.

1.5 Loan Consolidation System (LCS)

The Loan Consolidation System (LCS) supports the U.S. Department of Education’s (ED) Federal Direct Loan Program. Specifically, LCS allows borrowers to consolidate multiple student loans from multiple sources into one consolidated loan, funded and serviced by ED.

LCS provides the mechanism to convert DLSS and FFHLP originated loans into DLSS loans. LCS will combine eligible non-Direct loans into a single Direct loan at a borrower’s request. A new loan is created within LSS and the existing loans are retired (paid-off). The new direct loan is then sent to LOS via CDS, which in turn sends the new loan to LSS via CDS for booking.

The processes associated with loan consolidation were originally part of LOS. However, for a number of reasons including differences in business rules, differences in processing a loan origination vs. a loan consolidation, and the volume of consolidations processed ED decided to split the consolidation portion of LOS off into its own system LCS.

LCS Batch Environment

- LOS and LCS are physically located on separate servers. LCS is on an HP T500, and LOS is on a HP T 600.
- LOS and LCS both use a relational database management system, Informix.
- LOS and LCS each have their own discrete database. LCS’s database design is an exact copy of LOS’s database design (data models are identical).
- Within LOS’s database, tables related to consolidation are empty. Within LCS’s database, specific tables related to origination are empty.
- Currently imaging data is passed back and fourth between LOS and LCS. Eventually they will each handle there own imaging data.
- LOS and LCS both run their own separate batch cycles.
- LOS and LCS do not share code at any level.
- In June, LOS and LCS will each receive and transmit their own separate files with external entities.

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LCS Client Side Environment

- The LCS application for on-line is PowerBuilder 4.0. They are planning to go to PowerBuilder 5.0 later this year. The target is to reach PowerBuilder 6.0.
- Currently (PB 4.0), LOS and LCS share one executable and share common objects within PB. The plan is that LOS and LCS will have their own PB executable when the upgrade to PB 5.0 goes live.
- The current plan is for LOS and LCS to be completely standalone by the PB 5.0 release.

LCS processing is client/server based and supports multiple primary application modules that manage loan consolidation for the Department. The architecture, based on an open operating system (UNIX), uses graphical user interfaces (GUIs).

GUI interfaces were and are being developed in PowerBuilder. Batch processing and reporting are supported by COBOL and C programs. A conversion effort for some of the batch transactions is currently underway from COBOL to C.

LCS runs on a HP T500 Server with a HP-UX operating system.

LCS uses a relational database management system (Informix) and an MS Access database to provide special reporting capabilities. Extracts from the Informix database are taken to populate the MS Access database. In addition, MS Excel is used to support contractor billing.

The processes comprising Loan Consolidation as discussed in the meeting closely matched the processes identified in the DFD diagrams. The following is the high level representation of the DFD:

Application Management

- Process Customer Service
- Process Consolidation Application
- Process FastTrack Consolidation
- Process PLUS Credit Check

Certification Management

- Process Verification Certificate
- Process Returned Verification Certificate
- Process Certification Issues

Promissory Note Management

- Process Outgoing Promissory Note Package
- Process Returned Promissory Note Package

Loan Funding Management

- Process Drawdown
- Fund Loan
- Book Loan
- Process Incorrect Payoff
- Process Excess Cash

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Support Service Management
Process CDS System Balancing
Process Master Billing Information

There is clearly a one to one relationship between processes and the physical application design of LCS.

Each LCS subsystem (or module) consists of a combination of the following components:

- One or more processes or activities.
- One or more windows for each process or activity that support the process or activity. These windows have Program IDs (i.e., w_lcs_loan_sn_select) and a Power Builder Library description (i.e., lcs.pbl). These are referred to as the On-Line Programs.
- One or more batch programs. These programs are primarily COBOL with some C.
- One or more report programs. These programs are primarily COBOL with some C.

Each process within LCS has some part or combination of these components. The components are unique to each process or activity. A COBOL batch program and its subprograms supports one and only one process. A set of PowerBuilder windows supports one and only one process.

The following conclusions can be drawn from analysis, documentation and the meeting:

- LCS maps to 4 of the Project EASI/ED subsystems: Aid Application, Aid Repayment, Aid Origination and Disbursement, and Program Management and Oversight.
- Subsystems are independent of one another at the code level (i.e. no sharing of code across subsystems).
- COBOL and C programs exist within one and only one subsystem of LCS and support one and only one process within that subsystem.
- Subsystems and programs within those subsystems have dependencies at both the file and database level. Certain subsystems expect files from other subsystems. Certain programs within a subsystem pass files between themselves for processing. Some subsystems interact with the main LCS database but are dependent on other subsystems to add/update the information in the database.
- A sequential dependency exists between the subsystems. The order that the subsystems operate in reflects the business process.
- LCS is extremely well structured both logically and physically. There is a high degree of correlation between the processes that LCS performs and the physical application (PowerBuilder, COBOL, and C) components.

1.6 Loan Origination System (LOS)

The Loan Origination System (LOS) is the initial entry point for new student loan information into the DLSS. LOS receives and processes all loan applications (origination records) and disbursements and records the receipt of the completed promissory note. LOS provides the principal communication link with the schools to regulate the flow of information. LOS also receives completed consolidation loans from LCS via CDS. When a loan origination is complete, as determined by a complete and accurate application, promissory note, and disbursement, LOS books the loan to LSS via CDS.

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LOS processing is client/server based and supports multiple primary application modules that manage loan origination for the Department. The architecture, based on an open operating system (UNIX), uses graphical user interfaces (GUIs).

GUI interfaces were and are being developed in PowerBuilder. Batch processing and reporting are supported by COBOL and C programs. A conversion effort for some of the batch transactions is currently underway from COBOL to C.

LOS runs on a HP T500 Server with a HP-UX operating system.

LOS uses a relational database management system (Informix) and an MS Access database to provide special reporting capabilities. Extracts from the Informix database are taken to populate the MS Access database. In addition, MS Excel is used to support contractor billing.

The processes comprising Loan Origination as discussed in the meeting closely matched the processes identified in the DFD diagrams. The following is the high level representation of the DFD:

Loan Origination Management
 Manage Loan Information
 Manage Promissory Note
 Manage Disbursement
Reconciliation Management
 Process Unused Funds
 Perform School Reconciliation
 Perform CDS System Balancing
Support Service Management
 Process Customer Service Request
 Manage Master Billing
 Manage Material

One new process was added to Reconciliation Management - Program Year Close-Out.

There is clearly a one to one relationship between processes and the physical application design of LOS.

Each LOS subsystem (or module) consists of a combination of the following components:

- One or more processes or activities.
- One or more windows for each process or activity that support the process or activity. These windows have Program IDs (i.e., w_los_loan_sn_select) and a Power Builder Library description (i.e., los.pbl). These are referred to as the On-Line Programs.
- One or more batch programs. These programs are primarily COBOL with some C.
- One or more report programs. These programs are primarily COBOL with some C.

Each process within LOS has some part or combination of these components. The components are unique to each process or activity. A COBOL batch program and its subprograms supports one and only one process. A set of PowerBuilder windows supports one and only one process.

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The following conclusions can be drawn from analysis, documentation and the meeting:

- LOS maps to 4 of the Project EASI/ED subsystems: Aid Application, Accounting, Aid Origination and Disbursement, and Program Management and Oversight.
- Subsystems are independent of one another at the code level (i.e. no sharing of code across subsystems).
- COBOL and C programs exist within one and only one subsystem of LOS and support one and only one process within that subsystem.
- Subsystems and programs within those subsystems have dependencies at both the file and database level. Certain subsystems expect files from other subsystems. Certain programs within a subsystem pass files between themselves for processing. Some subsystems interact with the main LOS database but are dependent on other subsystems to add/update the information in the database.
- A sequential dependency exists between the subsystems. The order that the subsystems operate in reflects the business process.
- LOS is extremely well structured both logically and physically. There is a high degree of correlation between the processes that LOS performs and the physical application (PowerBuilder, COBOL, and C) components.

1.7 Loan Servicing System (LSS)

The primary role of the Loan Servicing System (LSS) is to service Direct Loans while borrowers are in school, in deferment status, or in repayment. LSS receives all booked student loans from LOS (via CDS) and maintains them for their remaining life. This subsystem performs functions that include placing the loan into repayment at the proper time, billing the borrower, and tracking subsequent payments and delinquencies. When the loan is paid off, LSS closes the loan.

Documentation of LSS is limited. ED has made extensive modifications to the COTS package. These modifications were made through modifications and additions to the COBOL code. The database management system has configuration management tools (MMS - Module Management System) that tracks changes and expedites recompiling of new code. The degree of changes to the COTS is such that LSS no longer looks or operates like the original package.

LSS has one major (VAX VMS) and one minor (IBM) operating environment.

1. LSS runs on a DEC VAX 7610 running Digital Open VMS operating system. The system is written in VAX COBOL using the Rdb for OpenVMS relational database management system (RDBMS). Rdb for OpenVMS is a full function, SQL-based relational database system that provides all advantages of a full-featured database management system including data security, integrity, and optimized access. Digital Rdb for OpenVMS implements ANSI/ISO SQL as its standard interface to the database.
2. LSS operation is also supported by a Hitachi EX9000 running MVS/XA. The sole purpose of this environment is to support the interface between LSS and NSLDS.

LSS has seven major components (subsystems) as confirmed in the meeting:

1. Transaction Processing (TP)

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2. Billings (BL)
3. Interfaces (IF)
4. Servicing (SV) - On-line support and imaging
5. Delinquency (DQ)
6. CE and CF (Reports)
7. CI (Interface with CDS)

Each of these subsystems is composed of COBOL programs. The names of the COBOL programs within each subsystem start with the two letter identifier associated with the subsystem. The COBOL code is organized as a hierarchy of programs. One parent COBOL program makes calls to other COBOL programs for execution support. The COBOL programs are grouped to support specific processing. For example, within the TP subsystem all processing takes place. However, specific groupings of COBOL programs are used to perform specific types of processing (i.e., Loan processing vs. Payment processing).

LSS functionality is broken down into four distinct groups:

1. Loan Processing
2. Payment Processing
3. Customer Contact
4. System Data Maintenance

The following is a high level indication of how processes are supported within LSS:

- Loan Processing and Transfers - Batch Processing
- Loan Status Administration - Batch with minimum On-line Support
- Loan Discharge - Batch and Manual Support
- Loan Deferment and Forbearance - Batch and On-line
- Loan Cancellation - Batch
- Payment Processing - Batch
- Customer Contact - Batch. Exceptions are handled On-Line. (Exceptions: Recycle File, Borrower or Customer Related). Skip Tracing also has a manual component.

The following conclusions can be drawn from analysis, documentation and the meeting:

- LSS maps to 5 of the Project EASI/ED subsystems: Aid Application, Accounting, Aid Origination and Disbursement, Aid Repayment, and Program Management and Oversight.
- Subsystems are independent of one another at the code level (i.e. no sharing of code across subsystems).
- Subsystems have dependencies at both the file and database level. Certain subsystems expect files from other subsystems. Some subsystems interact with the main LSS database but are dependent on other subsystems to add/update the information in the database.
- The COBOL programs are clearly identified as to the group they belong within and as to the process they support. A COBOL program supports one and only one process or activity.
- A new WEB component has been added requiring a separate PC and DEC protocols to move data from the PC to the mainframe.
- LSS requires minor modifications in order to address the Y2K problem. They plan on having these problems addressed by June 98.

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1.8 Multiple Data Entry (MDE-ACT)

The MDE system receives paper FAFSAs from applicants, optically scan or key enter the FAFSAs into an information system, and submit the data electronically to CPS. MDEs also collect signature sheets from applicants who submit FAFSAs to ED electronically, and apprise CPS of signature receipt so that CPS can process electronic FAFSAs.

MDE runs on a SUN SPARC20 and Compaq PC with SunOS and NT operating systems respectively. The custom application Software consists of SAS, C, Rexx, and DELB. The data management software used is DB2, MS-Access, and RRI DMS.

MDE-ACT has Nine major components (systems) as documented in the *Application System Walkthrough, 8/20/96 and History Correction Systems Walkthrough, 8/27/96*) and confirmed in the meeting:

1. Document Preparation
2. Document Imaging
3. Image Processing
4. Data Processing
5. Telecommunications
6. Process Control
7. MIS
8. System Control
9. Document Archival

The following conclusions can be made regarding MDE-ACT:

- MDE maps to one Project EASI/ED subsystem - Aid Application. Because of this, MDE is not considered a candidate for partial shut down. It will either be completely reused or completely replaced.
- The subsystems of MDE are an integrated set of COTS packages with some custom code.
- MDE will require some minor upgrades to handle the Y2K problem. Should be done by Jan. 1999.

1.9 National Student Loan Data System (NSLDS)

NSLDS is a national database of loan/grant level data awarded to students under Title IV. NSLDS was developed to provide a centralized and integrated view of Title IV loans and grants throughout all stages of their lifecycle from aid approval through disbursement, repayment, delinquency, and closure. The overall purpose of NSLDS is to support the Department of Education in a variety of operational and research functions aimed at improving the administration and delivery of student aid and the efficiency of the Title IV aid programs.

NSLDS Objectives:

- To provide a central verification system to determine the eligibility of Title IV aid applicants with respect to prior aid received.
- To provide a comprehensive student loan database.
- To provide a database of lender, school, GA, and FDLP Servicer profile data.
- To improve the quality and accessibility of student loan data.

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- To ease the burden on institutions administering Title IV loan programs and improve the efficiency of data transfer.

NSLDS processes and maintains data about the following Title IV programs:

- Federal Family Education Loan Program (FFELP)
- Federal Stafford Loans
- Federal Unsubsidized Stafford Loans
- Federal Supplemental Loan for Students (SLS)
- Federal Consolidation Loans
- Federal Parent Loans to Undergraduate Students (PLUS) Loans
- Campus-Based Programs
- Perkins Loans/National Direct Student Loans/National Defense Student Loans
- Income Contingent Loans (ICLs)
- Supplemental Educational Opportunity Grant (SEOG)
- State Student Incentive Grant (SSIG)
- Pell Grants
- Federal Direct Loan Program (FDLP)
- Federal Direct Stafford Loans
- Federal Direct Unsubsidized Stafford Loans
- Federal Direct PLUS Loans
- Federal Direct Unsubsidized Consolidation Loans
- Federal Direct Subsidized Consolidation Loans
- Federal Direct PLUS Consolidation Loans
- Federally Insured Student Loans (FISIL)

NSLDS uses DB2 as its data management software tool. The majority of the COBOL code was and is case tool generated (Composer 4). They will be upgrading their Composer in the near future. The majority of the data modeling in Composer is maintained at the PRAD level. The only use of COTS is for small supporting utility level activities (i.e., job restarts, archival routines).

NSLDS has been migrated to BAND 1.

The process “Manage ChargeBack Information” within NSLDS has been shut down.

The process “Manage Data Extraction” is an Ad hoc request process that is still accomplished outside of the NSLDS system. Supporting programs exist that actually execute the creation of the CBO, NCES, and BEX extracts.

New documentation is available on NSLDS. This new documentation will identify new functionality and the supporting COBOL programs. The key factor to note is that the methodology for adding the new functionality is identical to the methodology used in the past for adding functionality. Therefore, any

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conclusions drawn from the existing functionality and its relationship to physical code will hold with regards to the new functionality and its relationship to physical code.

As stated in section 1.3.3 of the NSLDS documentation, *NSLDS System/Subsystem Specifications, January 31, 1997*, NSLDS does not have clearly definable subsystems as traditionally thought. NSLDS, instead, is divided into three functional divisions referred to as business systems:

1. System Support
2. Repository Build
3. Reporting Capabilities

These primary business systems are each broken down into many other business systems. In the majority of cases the third level of break down provides the closest correlation to subsystems as defined in the Transition Plan task and provides the best mapping between logical processes and physical code. The third level of business systems is where the supporting COBOL programs are defined. These groupings of COBOL programs can be considered to be the set of code (subsystem) necessary to perform the business system process. However, the hierarchy of business systems is not intended to reflect a rigid division of functionality, business process, or system operation. The following two examples are given to clarify an understanding of the hierarchy of the business systems and their relationship to subsystems:

1. As noted earlier, the process of managing chargeback has been shut down. A review of Figure 1-4.2, NSLDS Business System Diagram, Section 1 page 10, in the NSLDS presentation document shows “Chargeback Support” and four sub-level business systems; Data Maintenance, Reports, Invoicing Cycle Processing, and System Maintenance. The only sub-level business system effected by the shut down of chargeback is Invoicing Cycle Processing. The other sub-level business systems were grouped under “Chargeback Support” because the functionality they provide supports the process of determining chargeback. Even though chargeback processing will not take place, the other sub-level business systems will remain operational.
2. The business system of “Student Status Confirmation” is a third level business system under “Reporting Capabilities” \ “Loan Administration”. See Figure 1-4.4, NSLDS Business System Diagram, Section 1, page 12, in the NSLDS presentation document. “Student Status Confirmation” business system is the physical component that maps to the logical process called “Manage SSCR Information” identified in the NSLDS DFD found in the *Project EASI/ED Current Systems Model, 04/16/97*. However, the COBOL program identified as “P175 Process SSCR Roster” could be looked at in a slightly different manner. P175 receives the updated SSCR rosters information from the schools, processes the information and writes the information to the database. This program, P175, could also be considered to be part of the key business system called “Repository Build” rather than “Reporting Capabilities”. In this case, P175 was logically grouped with the SSCR process because it is the final step in that business process. From the perspective of the system operations, P175 is part of repository build/data population activities.

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The following conclusions can be drawn from analysis, documentation and the meeting:

- NSLDS maps to 3 of the Project EASI/ED subsystems: Accounting, Aid Origination and Disbursement and Program Management and Oversight.
- NSLDS processes do correlate to specific sets of COBOL programs. Partial shut down would be possible within NSLDS. Data support to files and the NSLDS database would need to be maintained from Project EASI/ED subsystems/projects.
- COBOL programs are used in only one business system area.
- The relationship between logical processes and the physical structure of the code (business systems at the third level) correlate to a one to one relationship.
- COBOL programs are independent of one another at the code level (i.e. no sharing of code across programs). The COBOL programs do share Common Action Blocks to perform such activities as database activities, date validations, and security processes.
- For incoming files, NSLDS has a single program that receives the file, determines the type of information (i.e., school, GA, lender, student, etc.). This program then writes the information in the appropriate format to a file on the disk. Once on the disk, a specific program handles each specific file type (the school file program handles a school file).
- NSLDS programs have a job flow dependency (a single thread approach). A file comes into the system and is processed by the first program. When this program completes, the same file or a newly generated file is passed to the next program. This passing continues until the job stream is complete. The final step is that the file is archived, the database is updated with the appropriate information and the file is deleted.
- Data dependencies exist within the database. Business system areas share and require information provided and/or updated by other business system areas.
- A large majority of the functionality of NSLDS is contained in its reporting capabilities. No reporting tool is currently being used. Reports are generated through PRADS or COBOL code.

1.10 Postsecondary Education Participant System (PEPS)

PEPS maintains data on school eligibility and Title IV participation as well as demographic, accreditation, financial stability determination, programs offered, default history, program review, and audit information. This same data for lenders and guarantors will be in PEPS June 1998. At that time, IDS will be totally replaced and shut down.

Major functions:

- Tracking the determination of eligibility of various organizations to participate in the student financial aid programs.
- Recording findings and actions as a result of program reviews and CPA audits.
- Tracking default rate histories and ramifications, as well as producing default letters, press packages, and other related materials.

PEPS runs on a HP T500 with a HP-UX operating system. PEPS functionality is implemented through using an Oracle client/server technology. The PEPS data is maintained in an Oracle relational database that provides transaction control, data integrity constraints, security, data backup and recovery, and server-side functionality in the form of PL/SQL procedures, functions, and packages. The PEPS user application is implemented in Oracle Forms for Microsoft Windows. The PEPS Oracle Forms modules are also accessible through the Oracle Forms UNIX, character-mode environment for remote dial in users. The

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PEPS data is also available using reports implemented in Oracle Reports. PEPS batch processes are implemented using C with Oracle PRO*C, Oracle PL/SQL scripts, and UNIX scripts. These processes are designed to work with CA-Unicenters Work Management scheduling, security, and backup/restore modules to support the off-line operational, interface, and reporting requirements of PEPS.

PEPS is currently involved in heavy development activities that will be implemented by July 1998. These development activities are incorporating new functionality within PEPS. Current activities include:

- Closed School
- Support for GLOS operations
- Crosswalk and Administrative Site Support (Mailboxes and EDE)

NOTE: Default Management is in production in PEPS as of this date. Crosswalk and Administrative Sites will be in production April 1998. Also, IPOS does not need the Accreditation module anymore: they have decided the accreditation data in PEPS is sufficient, and we will just be giving them some enhancements, not a major module. The PEPS administration does not track enhancements, since PEPS is constantly being enhanced.

PEPS has a structured physical design that is slightly different from the traditional concept of coded subsystems. Instead, it has groupings of objects that support a particular functionality within PEPS. The primary functions of PEPS are to receive, process and store information in its database and to provide access to the information through on-line viewing, ad hoc queries, and reporting facilities.

PEPS physical structure can best be identified through its GUI interface. Specifically, within the main menu option of "School". Each one of these command options performs a specific function within PEPS. These functions match extremely well to the logical processes identified in the DFD.

Each one of these command options has a specific set of PEPS objects that are called in order to execute the function. PEPS objects include:

- Forms
- Views
- Sequences
- Triggers
- Functions
- Procedures
- Packages
- Tables
- Reports
- UNIX scripts

Each of the command options has its own unique set of objects. There are some common action blocks and utility type programs (i.e., UNIX Scripts, batch processes, triggers, stored procedures) that are shared by all command options but the core objects are unique.

The following conclusions can be drawn from analysis, documentation and the meeting:

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- PEPS maps to 2 of the Project EASI/ED subsystems: Aid Application and Program Management and Oversight.
- Command options within the main menu screen could be considered as representing the subsystems of PEPS.
- Each command option is independent of other command options in terms of all non-data objects, common action blocks, and utility code (UNIX scripts, triggers, batch processes, and stored procedures).
- Dependencies exist at the database level. Command options within the main menu are dependent upon one another to provide, maintain, and update data in the database.
- On-line programs do share objects but do not share code or programming at any other level.

1.11 Recipient and Financial Management System (RFMS)

The Recipient and Financial Management System (RFMS) will replace the Pell Grant Recipient and Financial Management System (PGRFMS), the current Title IV system.

PGRFMS supports the delivery of aid under the Federal Pell Grant Program. PGRFMS tracks at the grant level all Federal Pell Grants awarded each year, tracks planned and actual disbursements, supports reconciliation, calculates eligibility amounts, and aggregates planned Federal Pell Grant disbursements by school and submits this information to ED's accounting systems to authorize drawdown of funds.

RFMS will reflect the reinvention and redesign of the existing PGRFMS and funding processes. The end result will be a new system and new funding process flows that meet the requirements of the Pell Grant Program, the ISAMS initiatives, and Project EASI initiatives. The near-term objective is Pell Grant "just-in-time funding" fund control. The overall objective is to design a process and system not necessarily limited to the Federal Pell Grant Program.

In summary, the primary role of the Recipient Financial Management System (RFMS) will be identical to the role of PGRFMS with the following caveats:

- The potential to manage more than just Pell Grants.
- The modification of process and system to support "Just-in-Time" disbursements.
- The modification of process and system to support the "Continuous Reconciliation".

RFMS will be operating on ED/CCF, that is based on IBM's DB2 relational database management system (RDBMS). The RFMS database will be designed and implemented using the Composer CASE tool and CDSI's i.e.FARSTM data structures. In addition, several components from the existing PGRFMS will be used to work in conjunction with the main customized COTS package i.e.FARSTM.

RFMS will have nine major components (modules) as documented in the *Draft Implementation Plan (RFMS)*, July 8, 1997 and confirmed in the meeting:

1. General and Fund Accounting/Control
2. Disbursement Accounting/Control
3. Payment Management
4. RFMS Interface Module
5. Modified PGRFMS Student Subsystem
6. Modified PGRFMS Institution Subsystem

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7. Modified PGRFMS Forms and Reports
8. Utilities
9. MIS

The modified PGRFMS Student and Institution Subsystems will be modified to:

- Support the new processes for “Just-in-Time” and “Continuous Reconciliation”.
- Be Y2K compliant.

The old PGRFMS processes for initial authorization and the funding model will also be kept to support a select number of schools.

The PGRFMS Student and Institution Subsystems will be standalone. They will have their own set of unique files that they will manage.

Under PGRFMS, there is a system called the Data Management System (DMS). This system currently resides on two Sun workstations. The role of the DMS is to feed data from TIVWAN and Tape and Reel to the mainframe environment. The functionality that DMS currently provides will be part of RFMS. RFMS will be completely mainframe.

The following conclusions can be drawn from analysis, documentation and the meeting:

- PGRFMS maps to 4 of the Project EASI/ED subsystems: Aid Application, Aid Origination and Disbursement, Accounting and Program Management and Oversight.
- RFMS should map to the same four with modified/expanded/additional functionality.
- The development effort for RFMS is under way. ED is in the process of defining business rules. ED has defined file formats and is in the process of mapping the file formats to EDI file formats where necessary.
- Modifications to the Student and Institution Subsystems are also underway (early stages).
- RFMS is scheduled to go live July 1, 1999 (Award Year 1999 - 2000).
- The two subsystems that will be reused, Student and Institution, will interact with the i.e. FARS main system. At a minimum the relationship will be at a data level. It was unknown at this point whether or not there would be a link at the program level.
- Y2K is not a major problem, currently being addressed. ED is adding two positions to their batch number. ED is correcting only those dates that are identified as mission critical as well as using “bridging”. Schools will send data, the bridge will strip away the century and pass the data on to be processed. When data is returned, the bridge adds the century back.
- Planned for migration to Band 1, September 1998.

1.12 Title IV Wide Area Network (TIVWAN)

TIVWAN is a value-added network provided by General Electric Information Services (GEIS). The TIVWAN functions as a participant management system through which users indicate which services they want to use from the systems the TIVWAN supports (i.e., CPS, NSLDS, PGRFMS, LOS and FFELP System [soon]).

TIVWAN runs on an IBM 9672 with a MVS/ESA operating system. The subsystems are written in COBOL II. Integrated COTS software includes Focus, Data Analyzer, and Easytrieve

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TIVWAN has Seven major components (systems) as documented in the *Overview - System Title IV Wide Area Network (96-97)* and confirmed in the meeting:

1. Participant Management
2. Distribution
3. Process Control
4. Invoicing
5. Billing Query
6. Management Information System
7. Configuration Management

The following conclusions can be made regarding TIVWAN:

- TIVWAN maps to one Project EASI/ED subsystem - Accounting. Because of this, TIVWAN is not considered a candidate for partial shut down. It will either be completely reused or completely replaced.
- The subsystems of TIVWAN share a limited amount of code. Data is shared extensively across the subsystems.
- TIVWAN's importance will continue to grow as the requirement for electronic data exchange continues to become a reality.
- TIVWAN subsystems require some minor upgrades to handle the Y2K problem. Should be done by Jan. 1999.

Appendix D

Feasibility of Partial Shutdown

2. FEASIBILITY OF PARTIAL SHUTDOWN

Based on analysis of the Government Furnished Information (GFI) related to the Title IV systems and information gathered from the meetings held with the individual Title IV system representatives it was determined that it is feasible to partially shutdown each of the Title IV systems. The Project EASI/ED TP team developed the following analysis to determine and compare the relative ease of partial shutdown between the Title IV systems.

This section of Appendix D presents the:

- 13 criteria used to evaluate the relative ease of partial shutdown of the Title IV systems.
- Interpretation of criteria and the scale used to evaluate each of the criteria related to the ease of partial shutdown.
- Relative scores that each Title IV system received for each criterion.
- Results of analysis of relative ease of partial shutdown.

2.1 Title IV Systems' Ranking on Ease of Partial Shutdown

Table D2-1, Title IV Systems' Ranking on Ease of Partial Shutdown presents the 13 criteria and the associated score assigned to each Title IV system as well as a total score for each Title IV system.

	High	Medium	Low	CBS	CDS	CPS	FFELP	LCS	LOS	LSS	NSLDS	PEPS	RFMS	TIVWAN
1. What is the degree of physical application code modularity within the Title IV system?														
• How many subsystems within the system?	5	3	1	3	5	3	5	5	5	3	5	3	3	1
• How many modules (sub-subsystems) are within a subsystem?														
2. What is the degree of the relationship between the logical functionality and the physical application code modularity?	5	3	1	3	5	3	5	5	5	1	3	5	3	5
• What is the correlation of logical processes to physical structure (One to One, One to Many)?														
3. What is the degree of dependency among the physical application code modules related to code?	1	3	5	5	5	5	5	5	5	5	5	5	5	1
• Do modules call routines used within other modules, excluding call to stand-alone common code?														

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	High	Medium	Low	CBS	CDS	CPS	FFELP	LCS	LOS	LSS	NSLDS	PEPS	RFMS	TIVWAN
4. What is the degree of dependency/complexity among the physical application code modules related to data? <ul style="list-style-type: none"> Shared Files Database Shared Files and Database Sequential dependency for file/database processing Correlation of physical code to data processing (source/types of data), One to One, One to Many 	1	3	5	3	3	3	1	3	3	1	3	5	3	3
5. How much of the Title IV System's developmental code is IEF Composer or other CASE tool (e.g. Designer 2000) generated? <ul style="list-style-type: none"> Ease of generating new code (re-engineering) 	5	3	1	1	5	1	1	1	1	1	5	1	5	1
6. How much of an impact will the COTS portion of the Title IV System have on the modularity of the whole Title IV System? <ul style="list-style-type: none"> COTS will add an additional complexity factor when considering partial shutdown. Is the source code owned by ED? 	1	3	5	5	3	5	5	5	5	3	5	5	1	5
7. How conducive is the database management system to conversion to relational database management system such as Oracle? Given that network database are associated with FFEL and VSAM/ISAM is associated with CBS, <ul style="list-style-type: none"> A Network to Relational conversion is assumed to be most difficult. A VSAM/ISAM to Relational conversion is assumed to be less difficult than Network to Relational conversion. Relational to Relational is assumed to be the easiest. 	5	3	1	3	5	5	1	5	5	5	5	5	5	5
8. How well does the Title IV System support today's business processes/rules for student aid delivery? <ul style="list-style-type: none"> How much manual support does the system need? How much do users like the system? 	5	3	1	3	5	3	5	5	5	3	3	5	5	3
9. How well documented is the current Title IV System's physical application code structure? <ul style="list-style-type: none"> Quality and Quantity Currency Level of Detail (Overviews, Standards, Specifications, Detailed Designs, Models, Flow Charts, etc.) 	5	3	1	3	5	5	5	1	3	1	5	3	3	1

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	High	Medium	Low	CBS	CDS	CPS	FFELP	LCS	LOS	LSS	NSLDS	PEPS	RFMS	TIVWAN
10. How much modification/upgrade will the current Title IV System be experiencing over the next year or two? <ul style="list-style-type: none"> Business Process/Rules System Upgrades System Performance Y2K 	1	3	5	1	5	3	3	5	3	5	3	3	1	3
11. What degree of data ownership does the Title IV System have to the data in its database? <ul style="list-style-type: none"> Original Source (input point) Derived Data Maintainer of Data (edit point) 	5	3	1	5	1	5	3	3	3	1	1	5	1	5
12. Is the Title IV System primarily a Batch System vs. On-line? Given the nature of current Title IV systems, consider the following: <ul style="list-style-type: none"> Batch is less complex Online is more complex Any data update issues Any interface timing issues The complexity of interfaces 	5	3	1	5	3	5	3	3	3	3	3	1	5	3
13. What is the degree of complexity of the interfaces among the Title IV System and external entities? <ul style="list-style-type: none"> How many interfaces? Timing of data flows? Sequence of data flows? External Entity Types (Org., Systems) Batch or On-line? Direction of data flow? (Receive, Transmit, both) 	1	3	5	5	3	3	5	3	3	1	1	1	3	5
Totals:				45	53	49	47	49	49	33	47	47	43	41

Table D 2-1 Title IV Systems' Ranking on Ease of Partial Shutdown

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Feasibility of Partial Shutdown

2.2 Interpretation of the Criterion for Ease of Partial Shutdown

Table D2-2, Interpretation of the Criterion for Ease of Partial Shutdown presents an interpretation of how the scoring scale was applied to each of the criteria.

Criterion Number	Interpretation of the Criterion for Ease of Partial Shutdown
1.	A higher degree of modularity is rated better than a lower degree of modularity.
2.	A higher degree of relationship between logical processes and physical subsystems is rated better than a lower degree of a relationship.
3.	A lower degree of dependency between physical application code is rated better than a higher dependency.
4.	A lower degree of complexity between physical application code and data is rated better than higher complexity.
5.	The more code that is CASE tool generated suggests that the system is better suited for partial shutdown. Systems with more code that is CASE tool generated is rated better than those with no CASE-generated code.
6.	A system with a large COTS component means partial shutdown will be more difficult to implement due to ownership of source code and associated documentation. Systems with a larger COTS component is rated lower than those with no COTS software.
7.	Systems are rated on ease of data conversion as follows: Relational to Relational (5), CBS(VSAM) to Relational (3), FFELP (Network) to Relational (1).
8.	A current Title IV System that strongly supports the required business needs is considered more valuable than a system that has manual processes and does not fulfill all the business needs. Systems that better support business needs will more likely play a greater role in Project EASI/ED and will be more involved with partial shutdown.
9.	With better system documentation, the analysts and programmers will find it easier to implement partial shutdown. Therefore, systems with better documentation are rated higher than those with poor documentation.
10.	Systems with less upgrade/modification in the near term suggests a more stable current environment and is rated as better suited for partial shutdown.
11.	The more data a Title IV system owns suggests the system will be play a greater role in Project EASI/ED and will be more involved in partial shutdown.
12.	Given the nature of current Title IV batch and on-line programs, systems with more batch and less on-line programs suggests a stronger case to consider the Title IV system for partial shutdown.
13.	Less complex interfaces suggests a system is better suited for partial shutdown.

Table D 2-1 Interpretation of the Criterion for Ease of Partial Shutdown

Appendix D

Feasibility of Partial Shutdown

2.3 Title IV System Ranking and Grouping Based on Ease of Partial Shutdown

Table D2-3, Title IV System Ranking and Grouping Based on Ease of Partial Shutdown presents the results of the relative ease of partial shutdown analysis.

Title IV System	Score
CDS	53
CPS	49
LCS	49
LOS	49
FFELP	47
NSLDS	47
PEPS	47
CBS	45
RFMS	43
TIVWAN	41
LSS	33

Table D 2-1 Title IV System Ranking and Grouping Based on Ease of Partial Shutdown

See Subsection 3.2 of the Project EASI/ED transition plan for a discussion of these results.

Appendix D

Project EASI/ED Subsystem Sequence Driver Analysis

3. PROJECT EASI/ED SUBSYSTEM SEQUENCE DRIVER ANALYSIS

Development of the Project EASI/ED subsystems was determined to be the primary factor for developing the Project EASI/ED transition schedule. Therefore, a decision regarding the initial implementation order of the Project EASI/ED subsystems was necessary in order to begin the development of the Project EASI/ED transition schedule. Multiple drivers and their associated sequences were considered, resulting in the selection of following three drivers as candidates for analysis:

- External Need
- Development Schedule
- Internal Need

Table D3-1 below provides a definition for each of three original drivers and their associated Project EASI/ED subsystem sequence.

External Need	Development Schedule	Internal Need
Implementing Project EASI/ED subsystems in order of need perceived by the post-secondary education community	Implementing Project EASI/ED subsystems in an order that least impacts current systems development efforts underway	Implementing the Project EASI/ED subsystems in order of need as perceived by ED
Origination & Disbursement Application Repayment DSS PMOS Financial Services	Repayment Application Origination & Disbursement PMOS Financial Services DSS	Origination & Disbursement Financial Services DSS Application PMOS Repayment

Table D 3-1 Project EASI/ED Subsystem Sequence Drivers

In addition to these three business process oriented drivers, a fourth technical risk oriented driver was later introduced as an outcome of the analysis performed on the first three. This driver, “Minimum Bridges”, bases the implementation sequence of the Project EASI/ED subsystems on the order that results in the building of the fewest bridges. Since bridges have been determined to be the most technically risky endeavor within the subprojects of Project EASI/ED, minimizing the number of bridges leads to the technically least risky implementation sequence. This implementation sequence also results in shutdown of the Title IV systems in the most expedient manner, which further reduces technical risk within the development and operational environments.

This section of Appendix D presents:

- Each of the four potential Project EASI/ED subsystem sequence drivers.
- The assessment factors used to evaluate the drivers.
- The scoring of the technical risk assessment factors along with the final assessment scores.
- A graphical comparison of the number of bridges built based on each sequence.
- Impact to Title IV Systems (Partial and Full Shutdown).
- The selected implementation sequence driver.

Appendix D

Project EASI/ED Subsystem Sequence Driver Analysis

To assess the technical risk associated with each sequence, risk evaluation criteria were developed and the Project EASI/ED TP team assessed each sequence based on the criteria. The Project EASI/ED TP team considered the level of risk over the implementation life cycle of each of the Project EASI/ED subsystems within the sequence. The level of risk was evaluated in terms of the shape of a curve that would be created if the level of risk was plotted over the life cycle of the sequence implementation. The following ratings were applied to the following shaped curves:

- Low Risk: **5** for flat curves across the period of transition or curves peaking in the middle (bell shaped).
- Medium Risk: **3** for curves peaking at the end of the transition period.
- High Risk: **1** for curves peaking at the beginning of the transition period.

Appendix D

Project EASI/ED Subsystem Sequence Driver Analysis

3.1 Driver 1: External Needs

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
General															
1. How many current Title IV systems are impacted in each target subsystem of the sequence?	Origination & Disbursement	X	X			X	X	X	X		X		X		8
	Application			X	X		X	X		X	X				6
	Repayment		X			X	X		X						4
	DSS	X	X			X	X	X	X		X	X	X	X	10
	PMOS	X	X			X	X	X	X		X	X	X		9
	Financial Services	X	X			X		X	X				X	X	7
2. How many current Title IV subsystems are impacted in each target subsystem of the sequence?	Origination & Disbursement	5	1	0	0	4	2	3	1	0	1	0	5	0	24
	Application	0	0	2	1	0	2	2	0	1	3	0	0	0	11
	Repayment	0	8	0	0	18	4	0	4	0	0	0	0	0	34
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PMOS	5	2	0	0	3	1	1	3	0	2	6	1	0	24
	Financial Services	2	3	0	0	8	0	2	2	0	0	0	3	2	22
Bridges															
1. How many bridges are required between target and current systems given this sequence?	Origination & Disbursement	5	7	N/A	N/A	9	5	5	17	N/A	0	N/A	9	N/A	57
	Application	N/A	N/A	0	0	N/A	3	5	N/A	0	0	N/A	N/A	N/A	8
	Repayment	N/A	14	N/A	N/A	20	18	N/A	52	N/A	N/A	N/A	N/A	N/A	104

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
	DSS	2	3	N/A	N/A	6	3	3	1	N/A	4	3	2	5	32
	PMOS	5	3	N/A	N/A	1	0	3	19	N/A	0	0	2	N/A	33
	Financial Services	0	0	N/A	N/A	0	N/A	0	0	N/A	N/A	N/A	0	0	0
Interfaces															
1. Based on the current Title IV systems, how many interfaces to external entities will be shutdown	Origination & Disbursement	10	13	0	0	10	8	14	17	0	3	0	12	0	87
	Application	0	0	21	13	0	8	9	0	5	5	0	0	0	61
	Repayment	0	31	0	0	60	34	0	101	0	0	0	0	0	226
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PMOS	17	6	0	0	11	1	11	30	0	11	33	6	0	126
	Financial Services	3	10	0	0	13	0	13	18	0	0	0	15	11	83

Assessment Factors		Scoring Low Med High 5 3 1			Origination/ Disbursement	Application	Repayment	DSS	PMOS	Financial Services
Technical Risk										
1.	How are the total number of bridges to be created distributed across the sequence?	5			57	8	104	32	33	0
2.	How are the bridges to be maintained over time distributed given this sequence?	3			57	65	169	201	199	0
3.	Are the majority of the interfaces in the sequence front, middle, back, or flat loaded in terms of quantity?	5			87	61	226	0	126	83
4.	Based on the sequence, how are the Title IV Systems distributed according to the ranking for ease of partial migration, front , middle, back, or flat loaded?	3			3.0	4.7	3.5	N/A	3.0	2.4
5.	How are the Title IV Systems distributed in the sequence according to ease of conversion to a relational database?	5			4.3	4.7	4.0	N/A	4.3	4.1

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors	Scoring			Origination/ Disbursement	Application	Repayment	DSS	PMOS	Financial Services
	Low 5	Med 3	High 1						
6. How are the Title IV Systems distributed in the sequence according to whether their code is CASE tool generated or not?	5			2.5	1.7	2.0	N/A	2.3	2.1
7. How are the Title IV Systems distributed in the sequence according to quantity of current development activity?	3			3.3	3.7	4.5	N/A	3.2	3.0
8. How are the Title IV Systems distributed in the sequence according to total number of Title IV Systems impacted?	3			8	6	4	10	9	7
9. How are the Title IV Systems distributed in the sequence according to total number of subsystems impacted?	1			24	11	34	0	24	22
10. How many current Title IV systems shutoff with each target subsystem?	3			0	3	0	0	3	7
11. How are the Title IV Systems distributed in the sequence according to the quantity of vision requirements need to be implemented?	3			46	36	88	0	100	9
Total Score:	39								

Table D 3-1 Impact Assessment of Driver 1: External Needs

3.2 Driver 2: Development Schedule

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
General															
1. How many current Title IV systems are impacted in each target subsystem of the sequence?	Repayment		X			X	X		X						4
	Application			X	X		X	X		X	X				6
	Origination & Disbursement	X	X			X	X	X	X		X		X		8

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
	PMOS	X	X			X	X	X	X		X	X	X		9
	Financial Services	X	X			X		X	X				X	X	7
	DSS														0
2. How many current Title IV subsystems are impacted in each target subsystem of the sequence?	Repayment		8			18	4		4						34
	Application			2	1		2	2		1	3				11
	Origination & Disbursement	5	1			4	2	3	1		1		5		24
	PMOS	5	2			3	1	1	3		2	6	1		24
	Financial Services	2	3			8		2	2				3	2	22
	DSS														0
Bridges															
1. How many bridges are required between target and current systems given this sequence?	Repayment	N/A	14	N/A	N/A	20	18	N/A	52	N/A	N/A	N/A	N/A	N/A	104
	Application	N/A	N/A	0	0	N/A	3	5	N/A	0	0	N/A	N/A	N/A	8
	Origination & Disbursement	5	7	N/A	N/A	9	5	5	17	N/A	0	N/A	9	N/A	57
	PMOS	5	3	N/A	N/A	1	0	3	19	N/A	0	0	2	N/A	33
	Financial Services	0	0	N/A	N/A	0	N/A	0	0	N/A	N/A	N/A	0	0	0
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interfaces															
1. Based on the current Title IV systems, how many interfaces to external entities will be shutdown given this sequence?	Repayment	0	31	0	0	60	34	0	101	0	0	0	0	0	226
	Application	0	0	21	13	0	8	9	0	5	5	0	0	0	61
	Origination & Disbursement	10	13	0	0	10	8	14	17	0	3	0	12	0	87

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
	PMOS	17	6	0	0	11	1	11	30	0	11	33	6	0	126
	Financial Services	3	10	0	0	13	0	13	18	0	0	0	15	11	83
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Assessment Factors		Scoring Low Med High 5 3 1			Repayment	Application	Origination/ Disbursement	PMOS	Financial Services	DSS
Technical Risk										
1.	How are the total number of bridges to be created distributed across the sequence?	1			104	8	57	33	0	0
2.	How are the bridges to be maintained over time distributed across the sequence?	1			104	112	169	176	0	0
3.	Are the majority of the interfaces in the sequence front, middle, back, or flat loaded in terms of quantity?	1			226	61	87	126	83	0
4.	Based on the sequence, how are the Title IV Systems distributed according to the ranking for ease of partial migration, front , middle, back, or flat loaded?	3			3.5	4.7	3.0	3.0	2.4	N/A
5.	How are the Title IV Systems distributed in the sequence according to ease of conversion to a relational database?	1			4.0	4.7	4.3	4.3	4.1	N/A
6.	How are the Title IV Systems distributed in the sequence according to whether their code is CASE tool generated or not?	1			2.0	1.7	2.5	2.3	2.1	N/A
7.	How are the Title IV Systems distributed in the sequence according to quantity of current development activity?	5			4.5	3.7	3.3	3.2	3.0	N/A
8.	How are the Title IV Systems distributed in the sequence according to total number of Title IV Systems impacted?	5			4	6	8	9	7	0
9.	How are the Title IV Systems distributed in the sequence according to total number of subsystems impacted?	1			34	11	24	24	22	0
10.	How many current Title IV systems shutoff with each target subsystem?	3			0	3	0	3	7	0
11.	How are the Title IV Systems distributed in the sequence according to the quantity of vision requirements need to be implemented?	1			88	36	46	100	9	0
Total Score:		23								

Table D 3-1 Impact Assessment of Driver 2: Development Schedule

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Project EASI/ED Subsystem Sequence Driver Analysis

3.3 Driver 3: Internal Need

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
General															
1. How many current Title IV systems are impacted in each target subsystem of the sequence?	Origination & Disbursement	X	X			X	X	X	X		X		X		8
	Financial Services	X	X			X		X	X				X	X	7
	DSS	X	X	X		X	X	X	X	X	X	X	X		11
	Application			X	X		X	X		X	X				6
	PMOS	X	X			X	X	X	X		X	X	X		9
	Repayment		X			X	X		X						4
2. How many current Title IV subsystems are impacted in each target subsystem of the sequence?	Origination & Disbursement	5	1	0	0	4	2	3	1	0	1	0	5	0	24
	Financial Services	2	3	0	0	8	0	2	2	0	0	0	3	2	22
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Application	0	0	2	1	0	2	2	0	1	3	0	0	0	11
	PMOS	5	2	0	0	3	1	1	3	0	2	6	1	0	24
	Repayment	0	8	0	0	18	4	0	4	0	0	0	0	0	34
Bridges															
1. How many bridges are required between target and current systems given this sequence?	Origination & Disbursement	5	7	N/A	N/A	9	5	5	17	N/A	0	N/A	9	N/A	57
	Financial Services	2	5	N/A	N/A	13	N/A	2	17	N/A	0	N/A	6	0	45
	DSS	2	3	2	N/A	6	3	3	1	3	4	3	2	0	32

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
	Application	N/A	N/A	0	0	N/A	3	5	N/A	0	0	N/A	N/A	N/A	8
	PMOS	0	3	N/A	N/A	8	1	0	19	N/A	0	0	0	N/A	31
	Repayment	N/A	0	N/A	N/A	0	0	N/A	0	N/A	N/A	N/A	N/A	N/A	0
Interfaces															
1. Based on the current Title IV systems, how many interfaces to external entities will be shutdown given this sequence?	Origination & Disbursement	10	13	0	0	10	8	14	17	0	3	0	12	0	87
	Financial Services	3	10	0	0	13	0	13	18	0	0	0	15	11	83
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Application	0	0	21	13	0	8	9	0	5	5	0	0	0	61
	PMOS	17	6	0	0	11	1	11	30	0	11	33	6	0	126
	Repayment	0	31	0	0	60	34	0	101	0	0	0	0	0	226

Assessment Factors		Scoring Low Med High 5 3 1			Origination/ Disbursement	Financial Services	DSS	Applicatio n	PMOS	Repayment
Technical Risk										
1.	How are the total number of bridges to be created distributed across the sequence?	1			57	45	32	8	31	0
2.	How are the bridges to be maintained over time distributed given this sequence?	3			57	102	134	133	135	0
3.	Are the majority of the interfaces in the sequence front, middle, back, or flat loaded in terms of quantity?	3			87	83	0	61	126	226

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors	Scoring			Origination/ Disbursement	Financial Services	DSS	Applicatio n	PMOS	Repayment
	Low 5	Med 3	High 1						
4. Based on the sequence, how are the Title IV Systems distributed according to the ranking for ease of partial migration, front , middle, back, or flat loaded?	1			3.0	2.4	N/A	4.7	3.0	3.5
5. How are the Title IV Systems distributed in the sequence according to ease of conversion to a relational database?	3			4.3	4.1	N/A	4.7	4.3	4.0
6. How are the Title IV Systems distributed in the sequence according to whether their code is CASE tool generated or not?	5			2.5	2.1	N/A	1.7	2.3	2.0
7. How are the Title IV Systems distributed in the sequence according to quantity of current development activity?	1			3.3	3.0	N/A	3.7	3.2	4.5
8. How are the Title IV Systems distributed in the sequence according to total number of Title IV Systems impacted?	3			8	7	11	6	9	4
9. How are the Title IV Systems distributed in the sequence according to total number of subsystems impacted?	1			24	22	0	11	24	34
10. How many current Title IV systems shutoff with each target subsystem?	3			0	1	0	3	5	4
11. How are the Title IV Systems distributed in the sequence according to the quantity of vision requirements need to be implemented?	3			46	9	0	36	100	88
Total Score:	27								

Table D 3-1 Impact Assessment of Driver 3: Internal Needs

Appendix D

Project EASI/ED Subsystem Sequence Driver Analysis

3.4 Driver 4: Minimum Bridges

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
General															
1. How many current Title IV systems are impacted in each target subsystem of the sequence?	Application			X	X		X	X		X	X				6
	PMOS	X	X			X	X	X	X		X	X	X		9
	Financial Services	X	X			X		X	X				X	X	7
	Origination & Disbursement	X	X			X	X	X	X		X		X		8
	Repayment		X			X	X		X						4
	DSS														0
2. How many current Title IV subsystems are impacted in each target subsystem of the sequence?	Application			2	1		2	2		1	3				11
	PMOS	5	2			3	1	1	3		2	6	1		24
	Financial Services	2	3			8		2	2				3	2	22
	Origination & Disbursement	5	1			4	2	3	1		1		5		24
	Repayment		8			18	4		4						34
	DSS														0
Bridges															
1. How many bridges are required between target and current systems given this sequence?	Application	N/A	N/A	0	0	N/A	3	5	N/A	0	0	N/A	N/A	N/A	8
	PMOS	5	3	N/A	N/A	8	1	3	19	N/A	2	0	2	N/A	43
	Financial Services	3	5	N/A	N/A	14	N/A	2	17	N/A	N/A	N/A	6	0	47

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
	Origination & Disbursement	0	7	N/A	N/A	9	5	0	17	N/A	0	N/A	0	N/A	38
	Repayment	N/A	0	N/A	N/A	0	0	N/A	0	N/A	N/A	N/A	N/A	N/A	0
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interfaces															
1. Based on the current Title IV systems, how many interfaces to external entities will be shutdown given this sequence?	Application	0	0	21	13	0	8	9	0	5	5	0	0	0	61
	PMOS	17	6	0	0	11	1	11	30	0	11	33	6	0	126
	Financial Services	3	10	0	0	13	0	13	18	0	0	0	15	11	83
	Origination & Disbursement	10	13	0	0	10	8	14	17	0	3	0	12	0	87
	Repayment	0	31	0	0	60	34	0	101	0	0	0	0	0	226
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Assessment Factors		Scoring Low Med High 5 3 1			Application	PMOS	Financial Services	Origination/ Disbursement	Repayment	DSS
Technical Risk										
1.	How are the total number of bridges to be created distributed across the sequence?	5			8	43	47	38	0	0
2.	How are the bridges to be maintained over time distributed across the sequence?	5			8	51	98	108	0	0
3.	Are the majority of the interfaces in the sequence front, middle, back, or flat loaded in terms of quantity?	3			61	126	83	87	226	0
4.	Based on the sequence, how are the Title IV Systems distributed according to the ranking for ease of partial migration, front , middle, back, or flat loaded?	5			4.7	3.0	2.4	3.0	3.5	N/A
5.	How are the Title IV Systems distributed in the sequence according to ease of conversion to a relational database?	3			4.7	4.3	4.1	4.3	4.0	N/A
6.	How are the Title IV Systems distributed in the sequence according to whether their code is CASE tool generated or not?	1			1.7	2.3	2.1	2.5	2.0	N/A
7.	How are the Title IV Systems distributed in the sequence according to quantity of current development activity?	5			3.7	3.2	3.0	3.3	4.5	N/A

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors	Scoring			Application	PMOS	Financial Services	Origination/ Disbursement	Repayment	DSS
	Low 5	Med 3	High 1						
8. How are the Title IV Systems distributed in the sequence according to total number of Title IV Systems impacted?	5			6	9	7	8	4	0
9. How are the Title IV Systems distributed in the sequence according to total number of subsystems impacted?	3			11	24	22	24	34	0
10. How many current Title IV systems shutoff with each target subsystem?	3			3	1	1	4	4	0
11. How are the Title IV Systems distributed in the sequence according to the quantity of vision requirements need to be implemented?	1			36	100	9	46	88	0
Total Score:	39								

Table D 3-1 Impact Assessment of Driver 4: Minimum Bridges

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Project EASI/ED Subsystem Sequence Driver Analysis

3.5 Comparison of Impact to Number of Bridges Built

Project EASI/ED Subsystems	Maximum Number of Bridges Per Project EASI/ED Subsystem	Total Bridges Based on External Needs Implementation Driver	Total Bridges Based on Development Schedule Implementation Driver	Total Bridges Based on Internal Needs Implementation Driver	Minimum Number of Bridges Per Project EASI/ED Subsystem
Application	8	8	8	8	8
DSS	37	32	0	32	0
Financial Services	50	0	0	45	47
Origination & Disbursement	57	57	57	57	38
PMOS	43	33	33	31	43
Repayment	104	104	104	0	0
	299	234	202	173	136

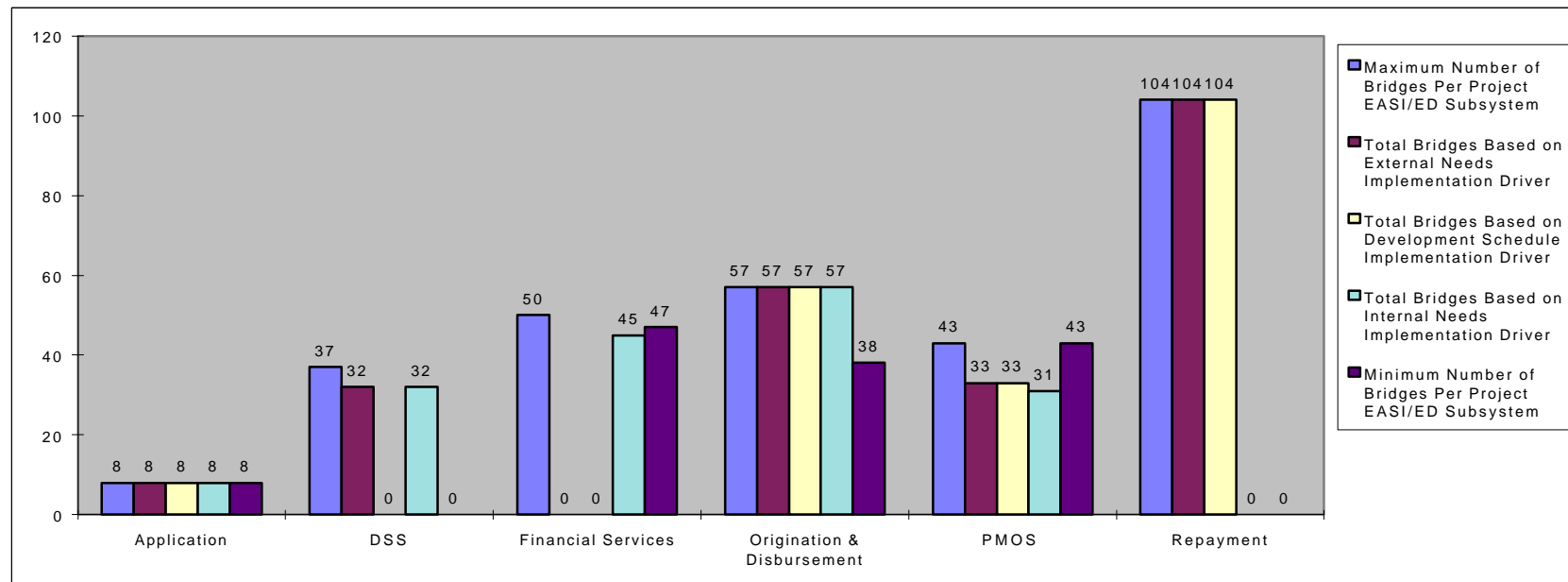


Table D 3-1 Comparison of Impact to Number of Bridges Based on Project EASI/ED Subsystem Implementation Sequence

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Project EASI/ED Subsystem Sequence Driver Analysis

3.6 Impact to Title IV Systems

Driver 1: External Need Project EASI/ED Subsystem Implementation Order	Partially Impacted Title IV Systems	Full Shutdown of Title IV Systems
Origination and Disbursement	CBS,CDS,FFEL,LCS,LOS,LSS,NSLDS,RFMS	None
Application	LCS,LOS,NSLDS	CPS,EDEExpress, MDE
Repayment	CDS,FFEL,LCS,LSS	None
DSS	CBS,CDS,FFEL,LCS,LOS,LSS,NSLDS,PEPS,RFMS, TIVWAN	None
PMOS	CBS,CDS,FFEL,LOS,LSS,RFMS	LCS,NSLDS,PEPS
Financial Services	None	CBS,CDS,FFEL,LOS,LSS,RFMS,TIVWAN
Driver 2: Development Schedule Project EASI/ED Subsystem Implementation Order	Partially Impacted Title IV Systems	Full Shutdown of Title IV Systems
Repayment	CDS,FFEL,LCS,LSS	None
Application	LCS,LOS,NSLDS	CPS,EDEExpress, MDE
Origination and Disbursement	CBS,CDS,FFEL,LCS,LOS,LSS,NSLDS,RFMS	None
PMOS	CBS,CDS,FFEL,LOS,LSS,RFMS	LCS,NSLDS,PEPS
Financial Services	None	CBS,CDS,FFEL,LOS,LSS,RFMS,TIVWAN
DSS	None	None
Driver 3: Internal Need Project EASI/ED Subsystem Implementation Order	Partially Impacted Title IV Systems	Full Shutdown of Title IV Systems
Origination & Disbursement	CBS,CDS,FFEL,LCS,LOS,LSS,NSLDS,RFMS	None
Financial Services	CBS,CDS,FFEL,LOS,LSS,RFMS	TIVWAN
DSS	CDS,CBS,CPS,FFEL,LCS,LOS,LSS,MDE,NSLDS, PEPS,RFMS	None
Application	LCS,LOS,NSLDS	CPS,EDEExpress,MDE
PMOS	CDS,FFEL,LCS,LSS	CBS,LOS,NSLDS,PEPS,RFMS
Repayment	None	CDS,FFEL,LCS,LSS
Minimum Bridges Project EASI/ED Subsystem Implementation Order	Partially Impacted Title IV Systems	Full Shutdown of Title IV Systems
Application	LCS,LOS,NSLDS	CPS,EDEExpress,MDE
PMOS	CBS,CDS,FFEL,LCS,LOS,LSS,NSLDS,RFMS	PEPS
Financial Services	CBS,CDS,FFEL,LOS,LSS,RFMS	TIVWAN
Origination & Disbursement	CDS,FFEL,LCS,LSS	CBS,LOS,NSLDS,RFMS
Repayment	None	CDS,FFEL,LCS,LSS
DSS	None	None
Modified Minimum Bridges Project EASI/ED Subsystem Implementation Order	Partially Impacted Title IV Systems	Full Shutdown of Title IV Systems
Financial Services	CBS,CDS,FFEL,LOS,LSS,RFMS	TIVWAN
Application	LCS,LOS,NSLDS	CPS,EDEExpress,MDE
PMOS	CBS,CDS,FFEL,LCS,LOS,LSS,NSLDS,RFMS	PEPS
Origination & Disbursement	CDS,FFEL,LCS,LSS	CBS,LOS,NSLDS,RFMS
Repayment	None	CDS,FFEL,LCS,LSS
DSS	None	None

Table D 3-1 Impact (Partial and Full Shutdown) to Title IV Systems Based on Project EASI/ED Implementation Sequences

Appendix D

Project EASI/ED Subsystem Sequence Driver Analysis

3.7 Driver 4: Minimum Bridges (Modified)

Based on the scores resulting from the risk assessment, bridges development counts per Project EASI/ED subsystem sequence, and impacts to Title IV systems. ED selected the minimum bridges sequence driver with one modification. Based on feedback from both internal and external stakeholders, the Financial Services Subsystem was moved from the third position in the implementation order to the first position. This was based on the opinion of both stakeholder groups that the development of single, modernized accounting system was a key focal point for the development of Project EASI/ED. This subsection presents the assessment of the modified minimum bridges sequence of the Project EASI/ED subsystems.

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
General															
1. How many current Title IV systems are impacted in each target subsystem of the sequence?	Financial Services	X	X			X		X	X				X	X	7
	Application			X	X		X	X		X	X				6
	PMOS	X	X			X	X	X	X		X	X	X		9
	Origination & Disbursement	X	X			X	X	X	X		X		X		8
	Repayment		X			X	X		X						4
	DSS														0
2. How many current Title IV subsystems are impacted in each target subsystem of the sequence?	Financial Services	2	3			8		2	2				3	2	22
	Application			2	1		2	2		1	3				11
	PMOS	5	2			3	1	1	3		2	6	1		24
	Origination & Disbursement	5	1			4	2	3	1		1		5		24
	Repayment		8			18	4		4						34
	DSS														0
Bridges															
1. How many bridges are required between target and current systems given this sequence?	Financial Services	3	5	N/A	N/A	14	N/A	2	17	N/A	N/A	N/A	6	0	47
	Application	N/A	N/A	0	0	N/A	3	5	N/A	0	0	N/A	N/A	N/A	8

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors		CBS	CDS	CPS	ED Expr.	FFEL	LCS	LOS	LSS	Mde	NSLDS	PEPS	RFMS	TIVWA N	Total
	PMOS	5	3	N/A	N/A	8	1	3	19	N/A	2	0	2	N/A	43
	Origination & Disbursement	0	7	N/A	N/A	9	5	0	17	N/A	0	N/A	0	N/A	38
	Repayment	N/A	0	N/A	N/A	0	0	N/A	0	N/A	N/A	N/A	N/A	N/A	0
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interfaces															
1. Based on the current Title IV systems, how many interfaces to external entities will be shutdown given this sequence?	Financial Services	3	10	0	0	13	0	13	18	0	0	0	15	11	83
	Application	0	0	21	13	0	8	9	0	5	5	0	0	0	61
	PMOS	17	6	0	0	11	1	11	30	0	11	33	6	0	126
	Origination & Disbursement	10	13	0	0	10	8	14	17	0	3	0	12	0	87
	Repayment	0	31	0	0	60	34	0	101	0	0	0	0	0	226
	DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Assessment Factors		Scoring			Financial Services	Application	PMOS	Origination/ Disbursement	Repayment	DSS
		Low 5	Med 3	High 1						
Technical Risk										
1.	How are the total number of bridges to be created distributed across the sequence?	3			47	8	43	38	0	0
2.	How are the bridges to be maintained over time distributed across the sequence?	5			47	55	98	108	0	0
3.	Are the majority of the interfaces in the sequence front, middle, back, or flat loaded in terms of quantity?	3			83	61	126	87	226	0
4.	Based on the sequence, how are the Title IV Systems distributed according to the ranking for ease of partial migration, front , middle, back, or flat loaded?	3			2.4	4.7	3.0	3.0	3.5	N/A
5.	How are the Title IV Systems distributed in the sequence	3			4.1	4.7	4.3	4.3	4.0	N/A

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Project EASI/ED Subsystem Sequence Driver Analysis

Assessment Factors	Scoring			Financial Services	Application	PMOS	Origination/ Disbursement	Repayment	DSS
	Low 5	Med 3	High 1						
according to ease of conversion to a relational database?									
6. How are the Title IV Systems distributed in the sequence according to whether their code is CASE tool generated or not?		1		2.1	1.7	2.3	2.5	2.0	N/A
7. How are the Title IV Systems distributed in the sequence according to quantity of current development activity?		3		3.0	3.7	3.2	3.3	4.5	N/A
8. How are the Title IV Systems distributed in the sequence according to total number of Title IV Systems impacted?		5		7	6	9	8	4	0
9. How are the Title IV Systems distributed in the sequence according to total number of subsystems impacted?		3		22	11	24	24	34	0
10. How many current Title IV systems shutoff with each target subsystem?		3		1	3	1	4	4	0
11. How are the Title IV Systems distributed in the sequence according to the quantity of vision requirements need to be implemented?		3		9	36	100	46	88	0
Total Score:		35							

Table D 3-1 Impact Assessment of Driver 4 (Modified): Minimum Bridges

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Analysis of Early Conversion to the Project EASI/ED COE

3.8 Technical Risk Assessment Factor Supporting Analysis

This subsection presents supporting analysis used to determine the values that were evaluated in the technical risk assessments for each of the Project EASI/ED subsystems sequence drivers (external needs, development schedule, internal needs, and minimum bridges). The following four tables support questions 4,5,6,7 respectively.

Assessment Factors : Technical Risk
Support Question 4 Analysis
Ranking for Partial Migration

Title IV Systems	Aid Application	Aid Origination and Disbursement	Aid Repayment	Financial Services	PMOS
CBS		1		1	1
CDS		5	5	5	5
CPS	5				
EDExpress	5				
FFEL		3	3	3	3
LCS	5	5	5		5
LOS	5	5		5	5
LSS		1	1	1	1
MDE	5				
NSLDS	3	3			3
PEPS					3
RFMS		1		1	1
TIVWAN				1	
Average of Partial Migration Ranking Score:	4.7	3.0	3.5	2.4	3.0

Table D 3-1 Technical Risk Assessment – Question 4 Supporting Analysis

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Analysis of Early Conversion to the Project EASI/ED COE

Assessment Factors : Technical Risk
Support Question 5 Analysis
Ease of Conversion to Relational DB

Title IV Systems	Aid Application	Aid Origination and Disbursement	Aid Repayment	Financial Services	PMOS
CBS		3		3	3
CDS		5	5	5	5
CPS	3				
EDExpress	5				
FFEL		1	1	1	1
LCS	5	5	5		5
LOS	5	5		5	5
LSS		5	5	5	5
MDE	5				
NSLDS	5	5			5
PEPS					5
RFMS		5		5	5
TIVWAN				5	
Average of Ease of Conversion Ranking Score:	4.7	4.3	4.0	4.1	4.3

Table D 3-2 Technical Risk Assessment – Question 5 Supporting Analysis

Assessment Factors : Technical Risk
Support Question 6 Analysis
CASE Tool Generated

Title IV Systems	Aid Application	Aid Origination and Disbursement	Aid Repayment	Financial Services	PMOS
CBS		1		1	1
CDS		5	5	5	5
CPS	1				
EDExpress	1				
FFEL		1	1	1	1
LCS	1	1	1		1
LOS	1	1		1	1
LSS		1	1	1	1
MDE	1				
NSLDS	5	5			5
PEPS					1
RFMS		5		5	5
TIVWAN				1	
Average of CASE Tool Usage Ranking Score:	1.7	2.5	2.0	2.1	2.3

Table D 3-3 Technical Risk Assessment – Question 6 Supporting Analysis

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Analysis of Early Conversion to the Project EASI/ED COE

Assessment Factors : Technical Risk Support Question 7 Analysis Development Activity

Title IV Systems	Aid Application	Aid Origination and Disbursement	Aid Repayment	Financial Services	PMOS
CBS		1		1	1
CDS		5	5	5	5
CPS	3				
EDExpress	3				
FFEL		3	3	3	3
LCS	5	5	5		5
LOS	3	3		3	3
LSS		5	5	5	5
MDE	5				
NSLDS	3	3			3
PEPS					3
RFMS		1		1	1
TIVWAN				3	
Average of Development Activity Ranking Score:	3.7	3.3	4.5	3.0	3.2

Table D 3-4 Technical Risk Assessment – Question 7 Supporting Analysis

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Analysis of Early Conversion to the Project EASI/ED COE

4. ANALYSIS OF THE CURRENT TITLE IV SYSTEMS ON EARLY CONVERSION TO THE PROJECT EASI/ED COE

Table D 4-1 rates each current Title IV system on the level of technical complexity associated with conversion to the Project EASI/ED COE. Any of the current Title IV systems may interface with the COE, but this analysis considered the technical complexity associated with moving the system as a whole into the Project EASI COE. The following ratings were used for technical complexity:

- High means high complexity associated with the migration into the Project EASI/ED COE
- Medium means medium complexity associated with the migration into the Project EASI/ED COE
- Low means low complexity associated with the migration into the Project EASI/ED COE.

The sources of the contents of Table D 4-1 is the *Project EASI/ED Common Operating Environment Document* (June 2, 1998). Table D 4-1 lists the hardware and supporting software (system and application) for each of the current Title IV systems and rates each system on technical complexity in the right column.

Title IV System	Application Software	Operating System/ Hardware	Technical Complexity Rating
Campus-Based Programs System	COBOL II Clipper 5.3 VSAM	MVS/ESA	High
CDS	IEF COBOL COBOL II C++ FARS (COBOL II, VSAM files, CICS teleprocessing) Composer DB2	MVS/ESA on IBM/ES9000	High Medium for non-accounting system (C++ for online, IEF COBOL for batch, Composer generated, DB2 backend).
CPS and EDEExpress	COBOL II Visual C++ Crystal Reports DB2	MVS on IBM 9672 DOS Windows 95	High Medium for independent components such as FAFSA on Web, Renewal FAFSA on Web, EDEExpress and the Crystal Reports module.
LOS	Microfocus COBOL Powerbuilder C CA-Unicenter Informix MS Access	HP-UX on HP-T600 Netware OS2	Low

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Analysis of Early Conversion to the Project EASI/ED COE

Title IV System	Application Software	Operating System/ Hardware	Technical Complexity Rating
LCS	Powerbuilder 4.0 COBOL C CA-Unicenter Informix	HP-UX on HP-T500	Low
LSS	COBOL II RDB for Open VMS PowerBuilder Cognos FileNET	Open VMS on DEC VAX 7610 MVS/XA	High Medium for the PC based systems (if independent).
FFELP	COBOL II Assembler JCL IDMS Informix	MVS/ESA	High
MDE	SAS C DB2 MS Access RRI DMS	SunOS Windows NT	Medium
NSLDS	COBOL II Rexx COBOL DB2 CICS	MVS/ESA	High
PGR/FMS	COBOL COBOL II Dbase Oracle	MVS/ESA SunOS	High
PEPS	Developer 2000 PL/SQL Pro C CA-Unicenter Oracle	HP-UX	Low
TIVWAN	COBOL II WAN System	MVS/ESA	High

Table D 4-1 Analysis of Converting Title IV Systems to the Project EASI/ED COE

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Analysis of Early Conversion to the Project EASI/ED COE

Table D 4-2 pairs the Project EASI/ED COE standards with the current Title IV systems' software. The numbers highlighted in the table represent a match between the Project EASI/ED COE standards listed under the table and the current Title IV system's software.

Title IV System	Integrated COTS Software	Custom Application Software	Data Management Software	Operating System	System Management Software
Campus-Based Programs System	Not Applicable	COBOL II 1 Clipper 5.3	VSAM	MVS/ESA	MVS/ESA
CDS	FARS Composer 19	IEF COBOL 1 COBOL II 1 C++ 2	DB2 CICS 13	MVS/ESA	TMON
CPS and EDEExpress	Enfin Crystal Reports Web applications (FAFSA) 5	COBOL II 1 Visual C++ 2 , 6	DB2	MVS DOS Windows-95 4, 9	Hear DB2 Custom Software for System Performance Monitoring
LOS	SNAP RJE MS Access CA Unicenter	Microfocus COBOL 1, 7 Powerbuilder C 2	Informix 17 MS Access 3	HP-UX 4, 8 Netware OS2	Harvest CA Unicenter 15 McAfee Novaback
LCS	UX-SNA-PLUS RJE CA Unicenter	Powerbuilder 4.0 22 COBOL 1 C 2	ESQL/ 3 Runtime Online DS	HP-UX 4, 8	CA Unicenter 15 OpenView 14 OMNI BACK II Novaback
LSS	PowerBuilder 22 Cognos 16 Easytrieve FileNET 17 , 20	COBOL II 1	RDB for Open VMS	Open VMS MVS/XA	DEC PS
FFELP	DYL-Audit Informix 12 ViewPoint	COBOL II 1 Assembler JCL	IDMS Informix 12	MVS/ESA	CA-11 LandMark
MDE	PowerScan 20 KIPP Image Key 20 RexxLib PVFS	SAS C 2 Rexx DELB	DB2 MS Access RRI DMS 18	SunOS 4, 10 Windows NT 4, 9	SAT Inventory Manager

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Analysis of Early Conversion to the Project EASI/ED COE

Title IV System	Integrated COTS Software	Custom Application Software	Data Management Software	Operating System	System Management Software
NSLDS	Composer 19	COBOL II 1 Rexx COBOL 1	DB2 CICS 13	MVS/ESA	InfoMan Netview OmegaMon TMON
PGR/FMS	Easytrieve SAS	COBOL 1 COBOL II 1 Dbase Rexx	Oracle 11	MVS/ESA SunOS 4, 10	Not Applicable
PEPS	HP-UX 4, 8 CA Unicenter 15	Oracle Developer 2000 3, 11, 21 PL/SQL 3 Pro C 2, 23	Oracle 3, 11	HP-UX 4, 8	HP-UX 4, 8 CA Unicenter 15
TIVWAN	Focus DataAnalyzer Easytrieve	COBOL II 1	Not Applicable	MVS/ESA	Heat WAN System

Table D 4-2 Cross-Check of Current Title IV Systems to Project EASI/ED COE Standards

COE Standards Cross Reference:

1. Programming Language – COBOL, ANSI X3.23:1985
2. Programming Language – C, ANSI/ISO/IEC 9899:1:1990
3. ANSI SQL2 ANSI X3.135:1992
4. Unix or Microsoft Windows-95/NT Operating System (several networking, security, communications, operating system, system management etc. standards in the Project EASI/ED COE supported)

COE Representative Products Cross Reference:

5. Netscape Navigator and Internet Explorer
IETF RFC 2068
InterNIC Internet Standard 0003
HTTP IETF RFC 2068:1997 Hypertext Transfer Protocol
6. Visual C++, Microsoft Corporation
7. COBOL Developer Suite for UNIX 4.0, Micro Focus
8. HP-UX 10.20, Hewlett-Packard Company
ISO/IEC 9945-2 POSIX Interface 1995
InterNIC Internet Standard 0008

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Analysis of Early Conversion to the Project EASI/ED COE

9. Windows NT 4.0 and Windows 95, Microsoft Corporation
InterNIC Internet Standard 0015
10. Solaris 2.6, Sun Microsystems, Inc.
POSIX ISO/IEC 9945-2:1995
IEEE 1003.15
11. Oracle 8, Oracle Corporation
ANSI SQL2 ANSI X3.135:1992
MDIS 1.0
Microsoft OIM
ODBC
12. INFORMIX-SE, Informix Software, Inc.
ANSI SQL2 ANSI X3.135:1992
ODBC
13. CICS Application Server, IBM Corporation
14. HP OpenView, Hewlett-Packard Company
InterNIC Internet Standard 0015
MIB-II
15. Unicenter TNG, Computer Associates, Inc.
InterNIC Internet Standard 0015
MIB-II
IEEE 1387
16. COGNOSuite OLAP Tool
MDIS 1.0
17. FileNET IMS
AIIM TR33
AIIM DMA 1.0
AIIM TR38
18. RRI FormWorks
ANSI/AIIM MS52
19. COOL:Gen and COOL:Enterprise by Sterling Software (formerly Composer)
IEEE 1462
20. ANSI/AIIM Document and Imaging Management
21. Developer/2000 Oracle
IEEE 1462

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Analysis of Early Conversion to the Project EASI/ED COE

ODBC

ANSI SQL2 ANSIX3.135:1992

- 22. Software Engineering Development Services Standards
- 23. Pro-C DBMS Services Programming Language Interface